9th Conference on Air Quality Modeling – A&WMA AB-3 Comments on AERMOD

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Air & Waste Management Association
Air Pollution Meteorology (AB-3) Committee

AERMOD Comments

- Low wind speed issues
- Modeling of roadways for NO_2 and PM
- Problems with modeling small urban areas
- Need for post-processor to combine multiple AERMOD runs
- Deposition support
- Adjustments for international applications

Low Wind Speed Issues

- Many investigators report that the worst-case AERMOD impacts occur for very low wind speeds, especially for low-level sources
- AERMOD has limited evaluation for these conditions
- ASOS use of sonic anemometer data and averaging of sub-hourly ASOS data will likely create more hours with very low wind speeds
- AERMOD needs supplemental evaluation to assess the accuracy of these “design concentration” predictions

Modeling of Roadway Sources

- Short-term NO_2 ,PM_{10} and $PM_{2.5}$ concentrations are dominated by mobile source impacts near major roadways
- Roadways are characterized by enhanced turbulence and low wind speeds generated by traffic itself
- Review of data from tracer studies and adjustments to AERMOD modeling procedures for roadway is an important issue for EPA to pursue
- Problems - few long-term monitors near roadways & quantification of emissions, especially PM, is questionable

Problems with Modeling Small Urban Sources

- Nocturnal urban mixing height (Ziu) is a function of population
- For small populations, Ziu can be quite low (e.g., about 200 m for a population of 50,000)
- This has been found to result in plume capping at night for all plumes, no matter how buoyant, leading to counter-intuitive results
- EPA should investigate this issue and correct the problem

Need for Postprocessor

- AERMOD runs can be very long
- Runs cannot be done separately and combined in postprocessor, as is done with CALPUFF
- EPA should develop a system like that of the CALPUFF system, or translate AERMOD conc. files to CALPUFF-like files
- TRC may have a draft code that can do this

Deposition Support

- Dry gas deposition is not included in the implementation guides but in the 2004 addendum – makes for some confusion
- Recommend that AERMOD guidance provide further implementation guidance to address use of dry gas deposition factors and the use of ANL physical parameters for common pollutants (Wesely, et.al, 2002)

Adjustments for International Applications

- International applications have challenges due to 12Z sounding times not at sunrise
- Bob Paine provided EPA (in October 2007) with several possible enhancements
  - Swapping of 12Z and 00Z sounding time labels
  - Adjustment of lower part of sounding to reflect morning minimum sfc temp
  - Enhanced debugging output
- EPA should make these enhancements available, at least in beta test form

AERSURFACE Comments

- Issues with AERSURFACE implementation
- Sensitivity of modeling to surface characteristics

Issues with AERSURFACE Implementation

- Land use determination very localized - within 1 km
  - Greater chance of mismatch in surface type between met tower and source
- For tall stack, buoyant releases, 1 km is too short of a fetch distance
- Low roughness near towers increases likelihood of low u_* and low wind speed issues
- Moisture assigned only on an annual basis

Sensitivity Test for Representativeness of Surface Characteristics

- Brode et al. have written paper for A&WMA 2008 Annual Meeting on sensitivity modeling
- We recommend use of AERSCREEN with different runs for met and application site surface characteristics
- If peak predictions are reasonably similar (say, within 10%), then assume that differences in site surface characteristics have a minor effect

AERMET Comments

- States advocating use of more recent data sets
- Many more calms in recent data sets – if considered missing as suggested in GAQM, does not meet 90% capture criteria
- If many calms, does CALMS preprocessor work properly? Conc artificially too low?
- Guidance needed on use of recent met data